



Resilience of Bajo Fisher Households in Konawe Regency, Indonesia: An Analysis of Access to Sustainable Livelihood Assets

Roslindah Daeng Siang*, Rosmawati, Irdam Riani, Sarini Yusuf, Nazra Nazira,
dan Wa Ode Resti Avanda

Department of Fisheries Agribusiness, Faculty of Fisheries and Marine Science, Halu Oleo University,
Kendari, Indonesia

*Corresponding Author: roslindahdgsiang@uho.ac.id

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ABSTRACT

The resilience of fishing households is crucial for managing income uncertainty and meeting basic daily needs. This issue is particularly relevant for Bajo fishing households, who are increasingly affected by economic, social, and environmental challenges. In Konawe Regency, the Bajo—an indigenous sea-oriented community—face distinctive difficulties, including declining fish stocks, climate-related risks, and limited access to public services. This study examined the capacity of Bajo fisher households to access key livelihood assets using the Sustainable Livelihood Approach (SLA) as a framework for evaluating resilience. Primary data were collected through a structured quantitative survey administered to 121 randomly selected Bajo fishing households from a population of 582 in Soropia District, Konawe Regency. The analysis followed the SLA framework and employed descriptive statistics to assess household access across different livelihood asset categories. The findings reveal that Bajo fisher households have moderate access to institutional, social, and natural capital, but limited access to human, physical, and financial assets. Strong institutional support—particularly in governance and community organization—emerges as a promising foundation for policy intervention. Strengthening the resilience of Bajo fisher households will therefore require targeted strategies to enhance underdeveloped livelihood capitals, especially in human, physical, and financial domains, while simultaneously reinforcing existing institutional strengths.

INTRODUCTION

The resilience of fisher households is a crucial aspect of sustainable development, especially in coastal communities where livelihoods depend heavily on marine resources. Resilience refers to a household's capacity to cope with uncertainties such as income instability and environmental changes while maintaining essential needs and livelihood functions (Sunny *et al.*, 2021; Wang *et al.*, 2024). In this context, the Bajo fisher community in Konawe Regency, Southeast Sulawesi, faces urgent and multidimensional challenges. Despite their reputation as a maritime society with deep expertise in marine

resource use, the Bajo remain disproportionately vulnerable to external pressures, including climate change, coastal ecosystem degradation, declining fish stocks, and limited access to infrastructure, education, and public services. As noted by **Utama and Wahyuni (2018)**, many Bajo households live below the poverty line and rely almost entirely on small-scale fishing, leaving them highly vulnerable during crises. Strengthening their livelihood resilience is therefore essential for inclusive and sustainable coastal development.

Recent Indonesia-based studies underscore the urgency of this issue. In Karimunjawa, small-scale fishers were found to have only “medium” resilience, particularly limited in buffer and self-organizing capacities, exposing them to shocks such as resource depletion and disaster events (**Al-hafidz *et al.*, 2024**). Meanwhile, in East Java, small-scale fishers have “borderline” food security and depend heavily on access to credit, education, and fishing gear to sustain their well-being (**Rahman *et al.*, 2023**). These findings highlight the precarious state of coastal livelihoods and the necessity of context-specific interventions, especially for marginalized groups such as the Bajo.

Sustainable livelihoods can cope with and recover from stresses and shocks, maintain or enhance their capabilities and assets, without undermining the natural resource base (**Nguyen *et al.*, 2019; Rajan & Pillai, 2020**). The Sustainable Livelihood Approach (SLA) provides a comprehensive framework for assessing how various forms of capital—natural, human, social, physical, and financial—interact to support resilience. It also highlights the importance of institutions, governance, and community participation in shaping livelihood outcomes (**Barnes *et al.*, 2017; Nguyen *et al.*, 2019; Kumar *et al.*, 2023; Bindeeba *et al.*, 2025**). This approach is particularly relevant in coastal contexts, where household vulnerability is influenced by both environmental exposure and structural inequalities (**Odoom *et al.*, 2022**).

However, despite the conceptual utility of SLA, there remains limited empirical application of this framework in Indonesia, particularly among culturally distinct groups such as the Bajo. While studies have explored coastal resilience more broadly, few have systematically assessed the asset-based resilience of indigenous maritime communities. Recent studies by **Rahatiningtyas *et al.* (2019)** in Kepulauan Seribu Regency, Jakarta Province, and by **Ali and Zamroni (2021)** in Takalar District, South Sulawesi, highlight the role of social capital and institutional support in fisher resilience. However, these studies often overlook the unique socio-cultural and spatial contexts of nomadic or semi-nomadic fishing groups. This study focuses on the Bajo of Konawe, whose livelihood strategies, mobility patterns, and cultural systems require context-specific resilience assessments. It thus addresses a critical gap in applying SLA to the Bajo, focusing on their asset portfolios and adaptive capacities.

The Bajo community, with its strong communal culture, possesses high social capital, which serves as a vital asset in facing daily challenges (**Fitriana & Stacey,**

2012). However, access to other forms of capital—such as human, physical, and financial—is often limited, potentially undermining their overall resilience (Béné *et al.*, 2016). Furthermore, environmental challenges such as climate change and coastal ecosystem degradation exacerbate the vulnerabilities of fishers (Masson-Delmotte, 2021; Sunny *et al.*, 2021). These impacts are reflected in declining fish catches and increased risks of natural disasters, which further burden fisher households in sustaining their livelihoods (Pomeroy *et al.*, 2006). In the Indonesian context, government policies such as fisher insurance programs and the development of fisheries infrastructure have been introduced to strengthen household resilience. However, their effectiveness still requires evaluation, particularly in the context of the Bajo community, which has unique socio-cultural characteristics (Ministry of Marine Affairs and Fisheries, 2020).

While several studies have assessed coastal livelihood resilience in Indonesia, few have focused on the Bajo community's differential access to livelihood assets through the SLA framework. This study aimed to identify and evaluate the access of Bajo fisher households to various livelihood assets that influence their resilience. It provides a comprehensive overview of social, human, natural, physical, financial, regulatory, and institutional assets. The findings are expected to yield deeper insights into strategies for strengthening fisher households' resilience in coastal areas and to inform more effective policy recommendations that support the sustainability of their livelihoods.

MATERIALS AND METHODS

1. Time and place

This research was conducted in the Soropia District, Konawe Regency, Southeast Sulawesi, an area with a predominantly Bajo population engaged in fishing. The study was carried out from July to October 2024, encompassing field surveys, interviews, and the collection of both primary and secondary data.

2. Data sampling

This study employed a quantitative approach using descriptive methods. The approach aimed to illustrate the capability of Bajo fishing households to access various livelihood assets and to identify factors influencing their household resilience. The population in this research included all Bajo fishing households residing in the Soropia District, totaling 582 households. The simple random sampling method was performed manually, resulting in 121 households as respondents. This technique was chosen to ensure each household had an equal chance of being included in the sample. The total number of households across six Bajo settlements was 1,179 households, of which 582 households rely directly on fishing. The sample size was determined using the Slovin formula (Mukti, 2025):

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

Where:

n = sample size

N = total population (582 households)

e = margin of error (0.05)

Thus, the sample size was calculated to be 119 households based on the six villages in Soropia District, Konawe Regency (Table 1).

Table 1. Number of Bajo fisherman samples in Soropia District, Konawe Regency

No	Village	Number of Bajo Fishermen	Sample
1	Bokori	92	20
2	Mekar	99	20
3	Bajo Indah	115	20
4	Bajo	106	20
5	Leppe	90	20
6	Saponda Laut	80	19
	Total	582	119

Source: **BPS Statistics Indonesia Konawe Regency (2024)**

3. Data collection

Data collection employed multiple methods. Primary data were obtained through a quantitative survey using structured questionnaires to assess access to livelihood assets, including social, human, natural, physical, financial, regulatory, and institutional capital. To complement these findings, in-depth interviews were conducted to gather qualitative information on the socio-economic conditions, environmental challenges, and adaptation strategies of fishing households. Structured field observations were also carried out to document the physical environment, infrastructure, and other assets in the Bajo community. In addition, secondary data were collected from local government reports, official village documents, and relevant literature.

The questionnaire was designed based on indicators of the Sustainable Livelihood Approach (SLA) modified from **Siang *et al.* (2023)**, covering:

- 1) Social Assets: Participation, collaboration ability, inter-ethnic relations, and social networks.
- 2) Human Assets: Education level, business experience, skills development, and access to capital assistance and mentoring.
- 3) Natural Assets: Diversity of marine resources (fish catch), waste/garbage management, and clean water sources.
- 4) Physical Assets: Transportation facilities, production facilities, and value of government support for production tools and funds.
- 5) Financial Assets: Production costs, household income, savings, and access to credit.

- 6) Institutional Assets: Participation in community/groups/traditional fisheries management institutions, roles in decision-making within these institutions, and compliance with prevailing regulations.
- 7) Regulatory Assets: Regulatory alignment, legal clarity and enforcement, and access to information on regulations/policies.

4. Data analysis

The data collected were analyzed using a quantitative descriptive method. Microsoft Excel was used to calculate the averages, percentages, and frequency distributions for each livelihood asset indicator. The analysis results were then categorized into three levels of access (high, medium, low) for each type of asset. This study adhered to ethical research principles, including obtaining respondents' consent through informed consent. The collected data were kept confidential and were used solely for academic purposes.

RESULTS

The Sustainable Livelihood Approach (SLA) was applied as a framework to assess the Bajo community's access to key livelihood assets, with particular emphasis on resilience, adaptive capacity, and long-term well-being. The analysis covers the performance of social, human, natural, physical, financial, institutional, and regulatory assets across different villages and livelihood types.

Social assets represent interpersonal and community-based support systems, while human assets reflect education, skills, and access to mentoring. Natural assets include access to marine resources and ecosystem services, whereas physical assets refer to infrastructure for efficient fishing operations and market access. Financial assets determine households' ability to invest, manage risks, and sustain livelihoods during shocks. Institutional assets—reflected in community participation, decision-making, and adherence to rules—strengthen governance and resource management. Lastly, regulatory assets provide an enabling environment that ensures fairness, predictability, and security in livelihood activities.

As illustrated in Fig. (1), physical and financial assets record the lowest mean scores (1–2), particularly in Bokori and Saponda Laut, highlighting critical deficiencies in infrastructure and economic security. In contrast, regulatory assets average between 2 and 5, with Mekar, Bajo, and Bajo Indah showing the strongest institutional alignment and legal awareness.

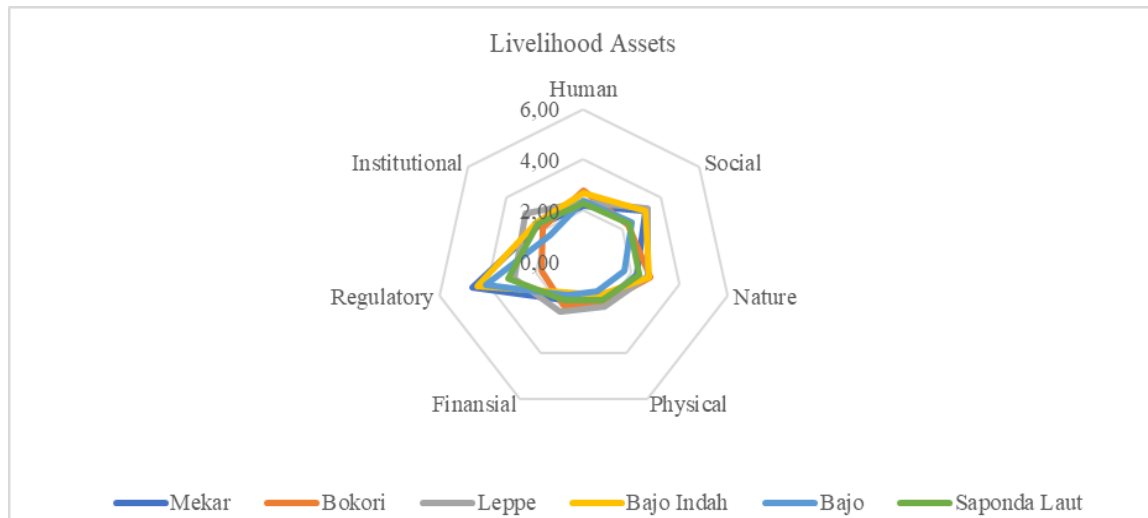


Fig. 1. Performance diagram of livelihood assets of Bajo communities by village in Soropia District, Konawe Regency, 2024

Based on Fig. (1), institutional assets with a range between 1-3, categorized as very low, encompass participation in community/groups/traditional fisheries management institutions, involvement in decision-making within these institutions, and adherence to applicable rules. However, in Leppe Village, access to institutional assets has reached a moderate access scale 3. Social, human, and natural assets fall within the moderate range, scoring 2-3, indicating limited social networks, participation, collaboration capabilities, and inter ethnic relations, as well as diversity in marine resources (fish catch), waste management, and access to clean water. Human assets include education levels, skills, and access to assistance. Conversely, regulatory assets achieve scores of 2-5, with high scores (4-5) in Mekar, Bajo, and Bajo Indah Villages, moderate scores (3) in Saponda Laut and Leppe Villages, and low scores (2) in Bokori Village. This suggests that Bajo fishermen's ability demonstrates the highest institutional alignment and legal awareness. From this pattern, the community exhibits strong livelihood potential in regulatory aspects but needs to sequentially improve access to physical, financial, institutional, natural, social, and human assets to support more sustainable livelihoods.

In Mekar Village, Bajo communities demonstrate high access to regulatory assets, moderate access to social and human assets, and low access to natural, physical, financial, and institutional assets. In Bokori Village, the community has moderate access to natural, human, and social assets, low access to physical, financial, and institutional assets, and very low access to regulatory assets. In Leppe Village, the community has moderate access to regulatory, institutional, and natural assets, and low access to physical, financial, social, and human assets. In Bajo Indah Village, the community demonstrates high access to regulatory assets, moderate access to natural, human, and social assets, and low access to physical, financial, and institutional assets. In Bajo Village, the community shows high access to regulatory assets, moderate access to social and human assets, low

access to natural, financial, and institutional assets, and very low access to physical assets. Meanwhile, in Saponda Laut Village, the community has moderate access to regulatory and natural assets and low access to institutional, physical, financial, social, and human assets.

Based on Fig. (2), financial and physical assets fall within the 1-2 scale, categorized as very low, with fish processing businesses scoring the lowest at scale 1, while capture fishers, fish collectors, octopus collectors, and civil servants are at scale 2. Institutional, social, and natural capital are categorized as moderate with scores of 2-3, indicating limited social networks, participation, cooperation, interethnic connections, marine resource diversity (fish catch), waste management, and clean water sources. Specifically, dry fish processing businesses have institutional asset access at scale 1 due to independent operations outside of any group or community. Human resource capital ranges from scale 2-4, reflecting limited access to human assets such as education levels, skills, and mentoring opportunities; physical assets such as transportation, production facilities, and access to inputs; as well as unstable financial assets related to production costs, income, savings, and loan access. However, regulatory capital reaches a high scale of 4-5 for all primary livelihood types among Bajo fishers. This indicates that the asset performance of Bajo fishers, based on primary livelihood types, has strong potential in the regulatory aspect but requires progressive improvements in access to physical, financial, institutional, natural, social, and human assets to support more sustainable livelihoods.

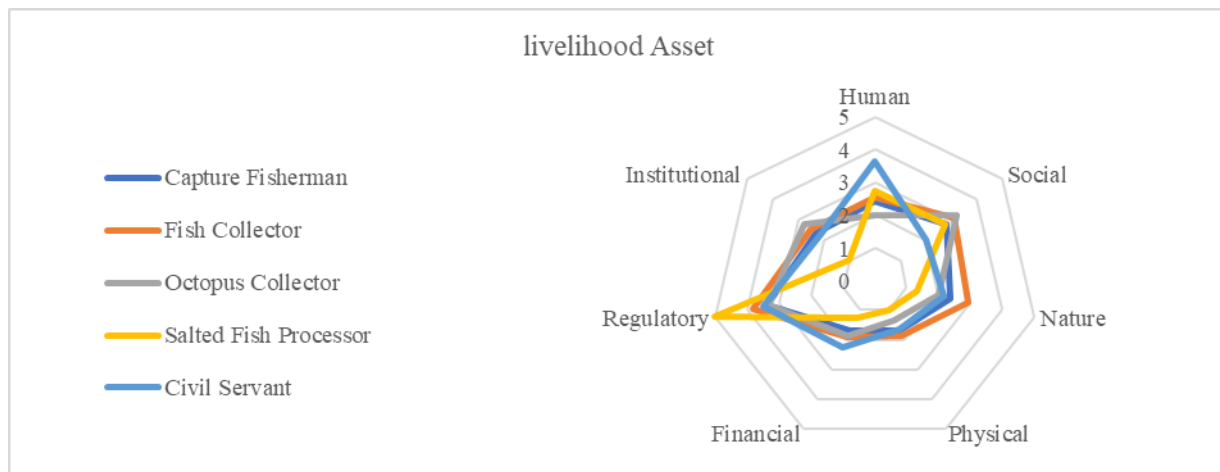


Fig. 2. Diagram of livelihood asset performance based on the primary livelihoods of the Bajo community in Soropia District, Konawe Regency, 2024

Based on Fig. (3), supplementary occupations such as cage aquaculture and fish collecting offer critical income diversification for Bajo households. Notably, households with non-fisheries secondary work report slightly better financial capital scores (2.1 vs 1.6), suggesting a buffering effect during seasonal declines in fish catch.

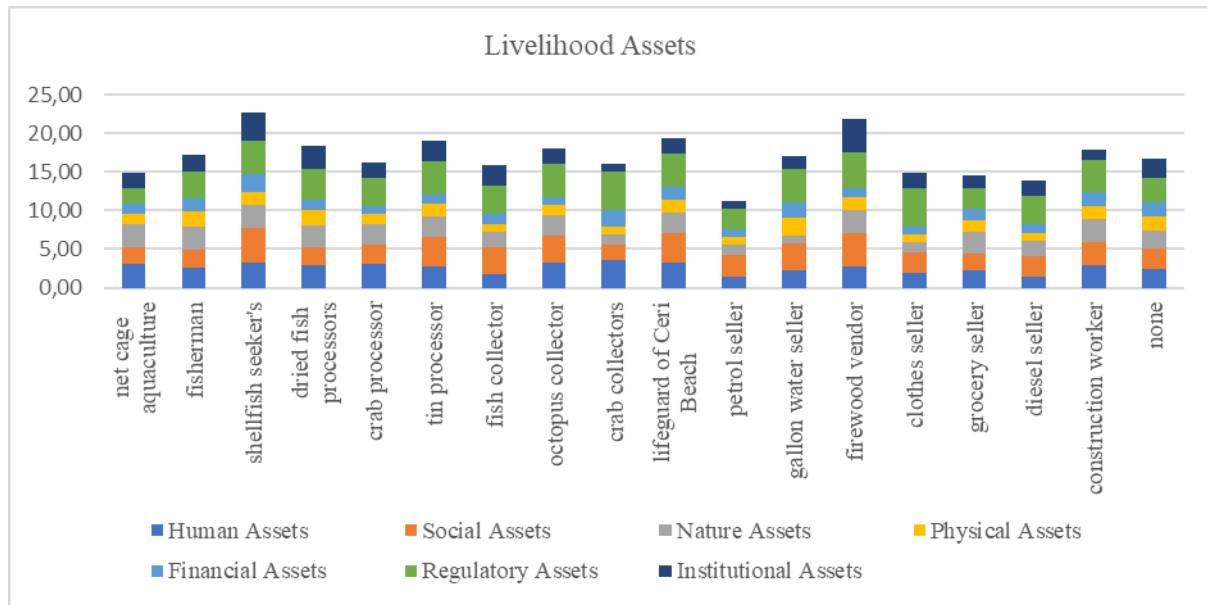


Fig. 3. Diagram of livelihood asset performance of the Bajo community based on supplementary occupations in Soropia District, Konawe Regency, 2024

DISCUSSION

The capabilities of the Bajo fishers are illustrated through the seven assets of sustainable livelihood, commonly referred to as the heptagon livelihood assets. **Muhammad *et al.* (2014)** similarly noted that empowering poor fishing households can be achieved through the heptagon asset and access approach, which encompasses natural, human, social, financial, physical, institutional, and regulatory capital.

Natural capital consists of resources used for livelihoods, such as land, water, fish, and forests. High natural capital values in a spidergram reflect resource abundance, while low values may indicate degradation or overexploitation. Regulatory assets refer to policies and rules that support resource management and economic activities; higher values suggest well-implemented supportive policies, whereas lower values highlight legal or administrative barriers. Institutional capital represents organizations and systems that support community livelihoods, such as cooperatives, NGOs, or government institutions. Strong institutional scores reflect active and effective institutions, while weak scores indicate limited institutional support.

Human capital includes knowledge, skills, health, and adaptive capacity. High values in the diagram suggest strong human resources, while low values point to the need for capacity-building through training or education. Social capital refers to networks, trust, and norms that foster cooperation within communities. Higher values signify cohesion and mutual support, whereas lower values suggest weak social ties. Financial capital includes income, savings, and access to credit, with lower values highlighting economic vulnerability. Physical capital represents infrastructure and assets such as

housing, fishing equipment, roads, and production facilities; strong values indicate adequate infrastructure, while weak ones reflect underdevelopment.

Across villages, access to these assets varies considerably. In Mekar, the Bajo community shows high regulatory asset access, moderate access to social and human assets, but low access to natural, physical, financial, and institutional assets. Bokori demonstrates moderate access to natural, human, and social assets, low access to physical, financial, and institutional assets, and very low regulatory access. In Leppe, moderate access exists for regulatory, institutional, and natural assets, with lower access to physical, financial, social, and human assets. Bajo Indah shows high regulatory asset access, moderate access to natural, human, and social assets, and low access to physical, financial, and institutional assets. In Bajo Village, regulatory access is high, social and human assets are moderate, while natural, financial, and institutional assets are low and physical assets very low. Lastly, Saponda Laut demonstrates moderate regulatory and natural asset access, but low access to institutional, physical, financial, social, and human assets.

Differences are also evident across occupations. Capture fishers have high regulatory and human capital, moderate financial and natural capital, but low physical and social capital and very low institutional capital. Fish collectors score highly on regulatory capital, moderately on natural, social, human, and institutional capital, but low on physical and financial capital. Octopus collectors display strong regulatory, institutional, and social capital, moderate natural and financial capital, and low human and physical capital. Dry fish processors show very strong institutional capital, moderate human and social capital, and low regulatory, financial, and physical capital. Meanwhile, government and private employees report high regulatory and human capital, moderate natural and financial capital, and low physical, social, and institutional capital.

Livelihood diversification emerges as a critical strategy for resilience. In Ghana, small-scale fishers increasingly turn to alternative income sources, such as oyster production, to counteract declining catches (**Amadu *et al.*, 2021**). In Brazil, wealthier fishers intensify fishing efforts, while poorer ones diversify their income (**Leite *et al.*, 2019**). Similarly, in Mexico, artisanal fishers pursue alternative livelihoods to sustain well-being amid socio-economic pressures (**Bravo-Olivas *et al.*, 2015**). Diversification thus mitigates risks and strengthens resilience. Social capital also plays a central role: fishers with strong community ties adapt more effectively to regulatory and environmental changes, as seen in the Great Barrier Reef (**Sutton & Tobin, 2012**). Likewise, resource-sharing practices and collective action enhance adaptive capacity in the face of seasonal variability (**Pellowe & Leslie, 2017**).

The Bajo community reflects this interplay between primary and supplementary occupations in both fisheries and non-fisheries sectors. Supplementary activities include cage aquaculture, shellfish gathering, fish processing, fish trading, and wage labor. Households whose main work lies outside fisheries often engage in supplementary

fishing, while those whose primary work is in fisheries diversify into non-fisheries activities. This dual strategy highlights adaptive responses to uncertainty, sustaining both income and resilience.

As a coastal society, the Bajo remain deeply intertwined with the marine environment. Fishing, gathering marine resources, and engaging with coastal ecosystems are not only their main livelihood activities but also integral to their cultural identity and social life. This heavy dependence underscores the importance of sustainable coastal resource management for their long-term well-being.

Strengthening resilience also requires attention to social capital, institutional arrangements, and governance frameworks. Socially, coastal communities face pressures that threaten cultural identity and local institutions. **Zamzami (2016)**, for instance, highlighted how fisher communities in Tiku draw upon local wisdom and social institutions to adapt while preserving culture. Initiatives such as *Jaga Pesisir Kita* demonstrate the importance of community empowerment in promoting resilience and sustainable resource management. Community involvement in conservation has been shown to yield better outcomes for both livelihoods and ecosystems (**Auer *et al.*, 2020**).

Institutional factors further shape resilience. In Bangladesh, constraints in institutional support hinder fishers' adaptive capacity (**Hossain & Rabby, 2019**), while community-based fisheries management can enhance resilience through empowerment and better governance (**Mozumder *et al.*, 2019**). Yet, poorly managed marine conservation areas risk undermining livelihoods despite conservation gains (**Islam *et al.*, 2018**). These examples highlight the need for policies balancing ecological sustainability with community well-being. As **Moses (2023)** stresses, integrated, participatory, and culturally sensitive governance is essential for fostering both ownership and sustainability in coastal resource management.

This study, however, has limitations. It relies on cross-sectional data from a limited number of households across six Bajo settlements, which may not fully capture seasonal or interannual variations. The use of self-reported data introduces the potential for recall bias, and the absence of longitudinal tracking limits the ability to assess long-term livelihood changes. Future research should incorporate time-series data, larger sample sizes, and mixed methods to provide deeper insights into livelihood dynamics.

Overall, the findings reveal an uneven distribution of livelihood assets across both villages and occupations. Regulatory and human assets are generally stronger, while institutional, physical, and financial assets remain weak. Livelihood diversification emerges as a vital coping strategy, reflecting the Bajo's adaptability in the face of ecological, economic, and institutional challenges. Targeted interventions to strengthen weaker asset areas—particularly institutional, physical, and financial capital—would significantly enhance resilience, while safeguarding both marine resources and cultural heritage.

CONCLUSION

The Bajo fishing community demonstrates moderate access to institutional, social, and natural assets, but limited access to human, physical, and financial assets. Notably, all primary livelihood types exhibit strong access to regulatory capital, underscoring the community's potential strength in governance and compliance aspects. These patterns are consistent across both primary and supplementary livelihoods, though village-level disparities remain evident. To strengthen the resilience of Bajo fishing households, systematic efforts are needed to improve access to physical, financial, institutional, natural, social, and human assets. Government agencies and community-based organizations should prioritize capacity building, infrastructure development, and inclusive institutional strengthening to support livelihood diversification and sustainability. Such targeted interventions are vital to enhancing the long-term socio-economic resilience of the Bajo and to ensuring the sustainability of coastal fishing communities more broadly.

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